Ma 320 Test – Section 1

J. Herdlick — Washington University — February 9, 2001

Calculators and a single $8\frac{1}{2}$ by 11 cribsheet can be used.

1. (15 points) Given below is a frequency table of the weights of 114 students rounded to the nearest pound. Construct a histogram for these data. How many classes did you use in the histogram? What is the class mark for each class? What percentage of the students weight less than or equal to 144.5 pounds?

Weight range	Frequency
104.5 to 124.5	6
124.5 to 144.5	45
144.5 to 164.5	43
164.5 to 184.5	16
184.5 to 204.5	4

2. (15 points) The numbers of hours worked by 10 employees are given below. Calculate the sample mean and the sample standard deviation for these data. What percentage of the observations is within one standard deviation of the mean?

52	52	50	47	54
49	53	45	48	51

3. (15 points) Graph the empirical distribution function (e.d.f.) for the data in the previous problem. Also, find the sample mode and the sample median.

4. (15 points) A summary of motor vehicle accident data is given in the following frequency or contingency table. Construct a relative frequency table for the data, complete with marginal probabilities. Find the probability that a driver was in a small car given that his injury was serious. Also, find the probability that a driver was either in a larger car or else did not have a serious injury. Is driver injury type independent of vehicle size? Support your answer mathematically.

Driver Injury

Vehicle Size:	Serious	Not serious
Small	200	807
Medium	214	1068
Large	250	1638

5. (15 points) The probability of rain varies from day to day as a random variable with the following density function:

$$f(x) = \begin{cases} 0 & \text{for } x \leq 0 \\ 2 - 2x & \text{for } 0 < x < 1 \\ 0 & \text{for } x \geq 1 \end{cases}$$

Find the probability that on a randomly selected day, the probability of rain will be less than 0.25. Also, find the probability that the probability of rain will be between 0.50 and 0.75. (*Hint*: Drawing a graph may be useful.)

6. Essay (5 points) In a short paragraph, describe three characteristics of continuous random variables.

7. Extra credit (5 points) Give an interesting example of a binomial random variable other than flipping a coin. Explain why it is a binomial random variable and calculate three probabilities for it using the binomial distribution function.